Cheese Wire Fenestration of a Chronic Juxtarenal Dissection Flap to Facilitate Proximal Neck Fixation during EVAR

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Background: To describe successful endovascular repair of a complex chronic aortoiliac dissection facilitated by a unique endovascular fenestration technique at the proximal neck.
Methods: A 57-year-old man presented with disabling lower extremity claudication and a remote history of medically treated type B aortic dissection. Computed tomographic angiography demonstrated a complex dissection with 7.1-cm false lumen aneurysmal dilatation and significant true lumen compression within bilateral iliac aneurysms and no suitable proximal infrarenal neck free of dissection.
Results: Using intravascular ultrasound, guidewires were introduced into true and false lumens. A 9F sheath was placed on the right side, and a 20-ga Chiba needle was positioned at the level of the celiac artery and oriented toward the dissection flap. The needle was advanced to puncture the flap, and a 0.014-in wire was then snared from the true to the false lumen. Shearing of the dissection flap in the juxtarenal segment was performed using a ''cheese wire'' technique, whereby both ends of the guidewire were pulled caudally in a sawing motion down through the infrarenal neck and into the aneurysm sac. Angiography confirmed absence of residual dissection and perfusion of the visceral vessels via the true lumen. Given the newly created infrarenal neck, standard endovascular aortic repair (EVAR) was performed and antegrade and retrograde false lumen flow was obliterated from the visceral vessels. Postoperative imaging confirmed aneurysm exclusion, no endoleak, and patent bilateral common iliac arteries with resolution of claudication symptoms and normal ankle-brachial indices.
Conclusions: Endovascular management of false lumen aneurysms in the setting of chronic dissection is limited by the ability of stent grafts to obtain adequate proximal or distal fixation. Endovascular fenestration of these chronic flaps facilitates generation of suitable landing zones, thereby serving as a useful adjunct to standard EVAR.

Stanford type B aortic dissections are typically managed medically with anti-impulse therapy aimed at achieving strict blood pressure control and monitoring for end-organ ischemia. Complicated type B aortic dissections may involve false lumen aneurysmal dilatation and associated true lumen compression, thereby resulting in malperfusion of the viscera or lower extremities and predisposing to aortic rupture. Endovascular treatment of aortic dissections has emerged as a viable therapeutic alternative to conventional open surgical approaches.

CASE REPORT

A 57-year-old man with a history of a type A aortic dissection and proximal descending thoracic aortic aneurysm repair underwent computed tomographic angiography (CTA) after the recent onset of disabling short-distance claudication in the setting of a known chronic residual

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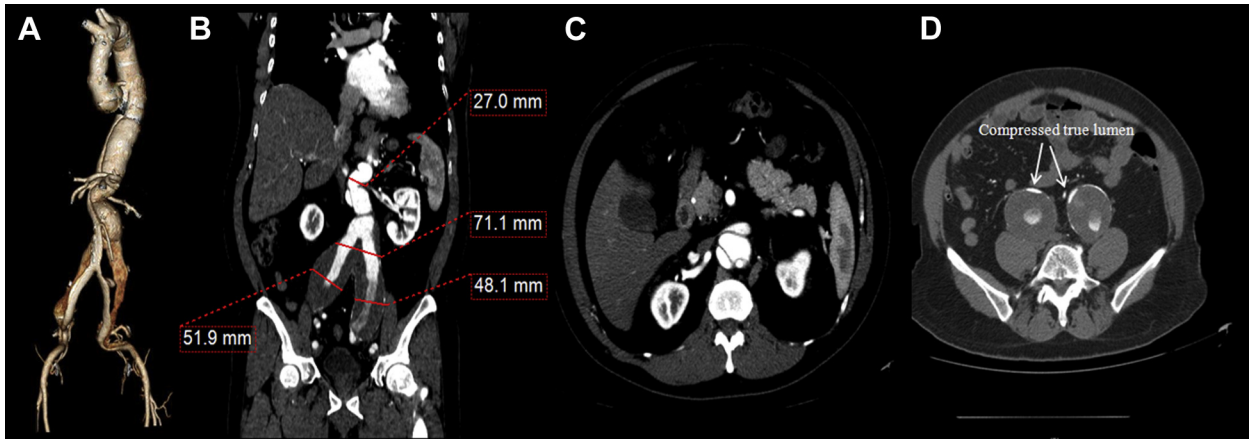

Fig. 1. Computed tomographic angiography demonstrating complex thoracoabdominal aortoiliac dissection (**A**) with false lumen dilatation (**B**), absence of adequate infrarenal neck for standard endovascular repair (**C**), and true lumen compression of bilateral iliac arteries (**D**).

type B aortic dissection. The imaging was notable for a complex thoracoabdominal aortoiliac dissection, which included a new 7.1-cm false lumen dilatation of the infrarenal abdominal aorta and significant true lumen compression within bilateral iliac artery aneurysms measuring 5.2 cm on the right and 4.8 cm on left (Fig. 1). The finding of false aneurysmal degeneration was not observed on imaging before 2 years. The true lumen supplied the inferior mesenteric, bilateral renal, and bilateral iliac arteries. The false lumen supplied the celiac artery, whereas the superior mesenteric artery had a shared origin from both the true and the false lumens. Aside from his claudication, the patient was otherwise asymptomatic and hemodynamically stable. Because of his significant past surgical history, which was complicated by multiple episodes of perioperative cardiac arrest, he was not deemed to be a candidate for open surgical intervention. Moreover, he was not considered an anatomically suitable candidate for standard endovascular aortic repair (EVAR) as a result of true lumen compression at the level of the infrarenal neck and a thickened septum. Our endovascular plan was therefore to create a more suitable infrarenal neck by performing an endovascular fenestration.

Using intravascular ultrasound guidance (8.5F, 10 MHz, Visions PV .035 Digital IVUS Catheter; Volcano Corp, San Diego, CA), transfemoral arterial access was obtained and guidewires were introduced into the true lumen from the right femoral artery and false lumen from the left femoral artery. Initial angiography confirmed appropriate wire access into the true and false lumens (Fig. 2). A 9F, multipurpose, shaped, guide catheter was advanced into the suprarenal location from the right femoral artery, traversing through the true lumen and oriented in a perpendicular fashion toward the false lumen. Using a 21-ga Chiba needle (Cook Medical, Bloomington, IN), a single-pass perforation of the dissection flap was performed, allowing advancement of a 0.014-in hydrophilic wire (Terumo Medical, Somerset, NJ) across the flap. Subsequent contrast injection from the right side confirmed successful entry into the false lumen. The newly created fenestration was dilated using a 4 mm balloon to facilitate transseptal advancement of a 4F Omni Flush Catheter (Angiodynamics, Latham, NY) from the true lumen side. A false lumen angiogram was then performed. Once we were confident that we had created a tract from true lumen to false lumen, we inserted an 18 mm EN Snare device (Merit Medical, South Jordan, UT) via a 7F sheath from the false lumen on the left side to capture the 0.014-in wire, thereby achieving through-and-through bifemoral guidewire access across the dissection flap. Using a ''cheese wire'' technique, gentle downward traction was applied to both the ends of the wire to shear the flap for several centimeters caudally. This maneuver was performed cautiously under fluoroscopy to ensure that intimal dissection did not extend beyond the aortic bifurcation.

Angiography then confirmed the creation of a suitable infrarenal neck for EVAR with a diameter of 27 mm that was free of significant thrombus and calcification (Fig. 3). A modular bifurcated Gore Excluder aortic stent graft (W.L. Gore and Associates, Flagstaff, AZ) measuring 35 mm × 14.5 mm × 16 cm was placed from the right femoral artery and positioned immediately caudal to the left renal artery. A 16 × 14.5 mm^2 contralateral limb was placed from the left femoral artery. Two iliac extension pieces were needed in the right iliac artery distribution to achieve an adequate seal, and this mandated coverage of the right hypogastric artery. The left hypogastric artery was preserved. Additional placement of a covered stent outside the treatment zone was ultimately required to resolve endoleaks secondary to fenestrations in the proximal bilateral external iliac arteries (10 mm × 5-cm VIABAHN stent graft [W.L. Gore and Associates] in right external iliac and 9 × 38 mm^2 iCAST stent graft